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10/626,436

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Klavs F. Jensen

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BOSTON, MA 02110

EXAMINER

LEUNG, JENNIFER A

ART UNIT

PAPER NUMBER

1764

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

# Office Action Summary

Application No.

10/626,436

Applicant(s)

JENSEN ET AL.

Examiner

Jennifer A. Leung

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 26 January 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 2-37 and 116-119 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2-37 and 116-119 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

Jennifer A. Leung  
4/10/2007

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 26, 2007 has been entered.

### ***Response to Amendment***

2. Applicant's amendment filed on January 26, 2007 has been received and carefully considered. Claims 1 and 38-115 are cancelled. Claims 2-37 and 116-119 are active.

### ***Declaration under 37 CFR 1.131.***

3. The declaration filed on January 26, 2007 under 37 CFR 1.131 is sufficient to overcome the Swinehart et al. (US 2005/0129580) reference.

Therefore, the rejection of claims 2, 5-13, 15, 18, 31-33 and 116-119 under 35 U.S.C. 102(e) as being anticipated by Swinehart et al.; the rejection of claims 3 and 4 under 35 U.S.C. 103(a) as being unpatentable over Swinehart et al. in view of Chandler et al. (US 6,506,584) and Yasuda et al. (US 6,244,738); and the rejection of claims 14, 16, 17, 19-30 and 34-37 under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Swinehart et al. have been withdrawn.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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The following is a quotation of the sixth paragraph of 35 U.S.C. 112:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

4. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, it is unclear as to what “means” (i.e., what structure and equivalents thereof, as set forth under 35 U.S.C. 112, sixth paragraph) corresponds to the “means for employing solution-based sol-gel processing”.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 5-7, 9-14, 16-32 and 116-118 are rejected under 35 U.S.C. 102(b) as being anticipated by Nikiforov (US 6,107,044).

Regarding claims 116 and 7, Nikiforov discloses an apparatus (i.e., microfluidic device **200**; FIG. 2) comprising: at least one inlet channel (i.e., injection channel **212**); at least one micromixing block (i.e., intersection **214**) downstream for the at least one inlet channel; an aging section comprising at least one aging channel (i.e., separation channel portion **210**) downstream from the micromixing block; and at least one outlet channel (i.e., leading to waste reservoir **208**) downstream from the aging section; wherein the at least one inlet channel **212**, the micromixing

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block **214**, the aging section **210**, and the outlet channel **208** reside on one integrated substrate (i.e., a body structure **202**). The recitation of “at least one colloidal nanoparticle” adds no further patentable weight because the inclusion of a material or article worked upon by an apparatus does not further limit apparatus claims.

Regarding claims 5 and 6, the width and depth of the inlet channel **212** is within the instantly claimed ranges (see column 3, line 49 to column 4, line 9).

Regarding claims 9 and 10, the width and depth of the aging channel **210** is within the instantly claimed range (see column 3, line 49 to column 4, line 9).

Regarding claims 11-13, the apparatus comprises means for introducing a first reactant stream (via **224**), a second reactant stream (via **206**), and a third reactant stream (via **218**) into a first inlet channel, a second inlet channel, and a third inlet channel, respectively (see FIG. 2).

Regarding claim 14, more than one reactant stream is introduced via one inlet channel (e.g., from reservoirs **216**, **218**, **220** and **222** connect to a single inlet channel; FIG. 2).

Regarding claims 16-18, 117 and 118, the apparatus of Nikiforov structurally meets the claims because the first, second and third reactant streams are not considered elements of the apparatus, and their respective flow rates are considered process limitations.

Regarding claims 19-30, the apparatus of Nikiforov structurally meets the claims because the synthesized colloidal nanoparticles are not considered elements of the apparatus.

Regarding claims 31 and 32, the micromixing block **214** has one or more channels having a width and depth within the instantly claimed ranges (see column 3, line 49 to column 4, line 9).

Instant claims 5-7, 9-14, 16-32 and 116-118 structurally read on the apparatus of Nikiforov.

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6. Claims 7-12, 14-30, 116 and 117 are rejected under 35 U.S.C. 102(b) as being anticipated by Wang et al. (*Chem. Commun.* 2002, pp. 1462-1463).

Regarding claims 116, 7 and 21, Wang et al. (see entire publication) discloses an apparatus comprising:

at least one inlet channel (i.e., the two channels formed by the Y-shape inlet, FIG. 1); at least one micromixing block (i.e., at the intersection of the two channels formed by the Y-shaped inlet, FIG. 1) positioned downstream from the at least one inlet channel; an aging section (i.e., the serpentine channel portion, downstream of the Y-shaped inlet; FIG. 1) positioned downstream from the at least one micromixing block; and at least one outlet channel (i.e., at the Y-shaped outlet, to 3; FIG. 1) positioned downstream from the aging section; wherein the inlet channel, micromixing block, aging section and outlet channel reside on one integrated substrate (i.e., a ceramic substrate).

The recitation of “at least one colloidal nanoparticle” adds no further patentable weight because the inclusion of a material or article worked upon by an apparatus does not further limit apparatus claims. In any event, Wang et al. further discloses that the apparatus may be used for synthesizing colloidal nanoparticles (e.g., titania particle having a size of less than 10 nm).

Regarding claims 8-10, the depth, width and length of the aging channel are within the instantly claimed ranges (i.e., a channel depth of 200  $\mu\text{m}$ , a channel width of 360  $\mu\text{m}$ , and a channel length of 9 cm; at page 1462, column 1, second to last paragraph).

Regarding claims 11 and 12, the apparatus comprises means for introducing a first reactant stream and a second reactant stream into a first inlet channel and a second inlet channel, respectively (i.e., via syringe and pumps at 1; see FIG. 1).

Regarding claim 14, the apparatus of Wang et al. structurally meets the claims, because the particular number of reactants to be fed to a single inlet channel is considered a process or intended use limitation that adds no further patentable weight to the apparatus claim. Each inlet channel is structurally capable of conveying more than one reactant.

Regarding claim 15, as best understood, the apparatus of Wang et al. comprises means for employing solution-based sol-gel processing, since the apparatus comprises all of the instantly recited structural components.

Regarding claims 16-18 and 117, the apparatus of Wang et al. structurally meets the claims because the first and second reactant streams are not considered elements of the apparatus, and their respective flow rates are considered process limitations.

Regarding claims 19, 20 and 22-30, the apparatus of Wang et al. structurally meets the claims because the synthesized nanoparticles are not considered elements of the apparatus.

Instant claims 7-12, 14-30, 116 and 117 structurally read on the apparatus of Wang.

7. Claims 7-30, 33-37 and 116-119 are rejected under 35 U.S.C. 102(a) as being anticipated by Chan et al. (*Nano Letters*, 2003, Vol. 3, No. 2, pp. 199-201).

Regarding claims 116 and 7, Chan et al. discloses an apparatus (see FIG. 1 and its description on page 200; also, generally, see entire publication) comprising:

at least one inlet channel (i.e., communicating with the “Inject” and “Dilute” vias; see flow direction in **b**); at least one micromixing block (i.e., at the intersection of the inlet channels, at the upper left corner of reactor **b**) positioned downstream from the at least one inlet channel; an aging section (i.e., comprising the “serpentine” channel portion in reactor **b**) positioned downstream from the micromixing block; and at least one outlet channel (i.e., in communication

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with the “Exit to flow cell” in reactor **b**) positioned downstream of the aging section; wherein the at least one inlet channel, at least one micromixing block, aging section, and at least one outlet channel reside on one integrated substrate (i.e., a glass wafer sandwich).

The recitation of “at least one colloidal nanoparticle” adds no further patentable weight because the inclusion of a material or article worked upon by an apparatus does not further limit apparatus claims. In any event, Chan et al. discloses that the apparatus may be used for synthesizing nanoparticles (e.g., CdSe nanocrystals).

Regarding claims 8-10, the width and depth of the aging channel are within the recited ranges (i.e., a width of 200  $\mu\text{m}$  and a depth of 57  $\mu\text{m}$ ; see description of FIG. 1). Also, the length of the aging channel (i.e., at 105 cm) meets the claim limitation of “about 100 cm”.

Regarding claim 11 and 12, the apparatus comprises means for introducing a first reactant and a second reactant into a first inlet channel and a second inlet channel, respectively (i.e., via the drilled vias, labeled “Inject” and “Dilute”, using syringe pumping).

Regarding claims 13 and 118, the apparatus further comprises means for introducing a third reactant into a third inlet channel (i.e., via another “Dilute” via, located downstream of the serpentine channel; using syringe pumping; see FIG. 1, **b**). The recitation of a particular flow rate for the third reactant, however, adds no further patentable weight to the apparatus claim, because the flow rate is considered a process limitation.

Regarding claim 14, the apparatus of Chan et al. structurally meets the claims, because the particular number of reactants to be fed to a single inlet channel is considered a process or intended use limitation that adds no further patentable weight to the apparatus claim. Each inlet channel is structurally capable of conveying more than one reactant.



Regarding claim 15, as best understood, the apparatus of Chan et al. comprises means for employing solution-based sol-gel processing, since the apparatus comprises all of the instantly recited structural components.

Regarding claims 16-18 and 117, the apparatus of Chan et al. structurally meets the claims because the first and second reactant streams are not considered elements of the apparatus, and their respective flow rates are considered process limitations.

Regarding claims 19-30, the apparatus of Chan et al. structurally meets the claims because the synthesized colloidal nanoparticles are not considered elements of the apparatus.

Regarding claims 33-35, 37 and 119, Chan et al. further discloses a quench fluid inlet port and means for introducing quench fluid into said port (i.e., at the second drilled via labeled “Dilute”, in communication with a “Dilute” channel; using syringe pumping; see FIG. 1, reactor **b**) located downstream of the aging section and upstream of the outlet channel. The recitation of a particular quench fluid, however, adds no further patentable weight the claim, since the quench fluid is not considered part of the apparatus.

Regarding claim 36, the apparatus comprises means for introducing at least one reactant stream into the microreactor at said at least one inlet channel (i.e., through the drilled vias for “Dilute” or “Inject” at the upper left portion of the reactor **b**; FIG. 1), wherein the quench fluid inlet port (i.e., at the other drilled via labeled “Dilute”) is adapted to introduce a quench fluid into the microreactor. The apparatus of Chan et al. structurally meets the claims because the particular flow rate of the quench fluid relative to the flow rate of the at least one reactant stream is considered a process limitation that does not further limit the apparatus.

Instant claims 7-30, 33-37 and 116-119 structurally read on the apparatus of Chan et al.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (*Chem. Commun.* 2002, pp. 1462-1463) in view of Yasuda et al. (US 6,244,738).

Wang et al. is silent as to the apparatus further comprising an ultrasonication means.

Yasuda et al., however, teaches an apparatus comprising a microchannel 20, wherein the apparatus further comprises an ultrasonication means in the form of an ultrasonication transducer attached to the apparatus (see elements 31, 32, 33, 41, 42, 43; FIG. 1, 2; column 1, line 5 to column 3, line 36). It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide an ultrasonication means in the apparatus of Wang et al., on the basis of suitability for the intended use, because the ultrasonication means comprises a stirrer having a structure that does not cause an increase in flow resistance in the channel, and is not susceptible to drops remaining in the channel, as taught by Yasuda et al. (column 1, lines 50-54).

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9. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (*Chem. Commun.* 2002, pp. 1462-1463) in view of Yasuda et al. (US 6,244,738), as applied to claim 2 above, and further in view of Chandler et al. (US 6,506,584).

The collective teaching of Wang et al. and Yasuda et al. is silent as to whether the ultrasonication means may comprise an ultrasonication bath, in which the microreactor or a portion thereof is emersed.

Chandler et al. (column 5, lines 4-26; column 7, line 24 to column 8, line 18; FIGs. 2, 4) teaches a conventionally known ultrasonication means comprising an ultrasonication transducer or an ultrasonication bath. It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the ultrasonication means of Chandler et al. for the ultrasonication means in the modified apparatus of Wang et al., on the basis of suitability for the intended use thereof and absent showing any unexpected results thereof, because the substitution of known equivalent structures involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

10. Claims 13, 33-37 and 118 and 119 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (*Chem. Commun.* 2002, pp. 1462-1463) in view of Barbera-Guillem et al. (US 6,179,912).

Regarding claims 13 and 118, Wang et al. is silent as to a means for introducing a third reactant stream into the microreactor at a third inlet channel. In any event, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to add another inlet channel to the apparatus of Wang et al., on the basis of suitability for the

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intended use and absent a showing of unexpected results thereof, because the duplication of parts was held to have been obvious. *St. Regis Paper Co. v. Beemis Co. Inc.* 193 USPQ 8, 11 (1977); *In re Harza* 124 USPQ 378 (CCPA 1960). For instance, Barbera-Guillem et al. evidences that it would have been obvious for one of ordinary skill in the art at the time the invention was made to add a third inlet channel to an apparatus for synthesizing nanoparticles, in order to allow for three separate reagents or solvents **A, B, C** to be fed to the microreactor, for synthesizing a particular nanoparticle composition (see FIG. 1). The recitation with respect to the flow rate of a third reactant stream, however, has not been given patentable weight, because the recitation is considered a process limitation.

Regarding claims 33-37 and 119, Wang et al. is silent as to the apparatus further comprising a quench fluid inlet port downstream from the aging section and upstream from the at least one outlet channel. Barbara-Guillem et al., however, teaches that, "As is known to those skilled in the art, and depending on the nature of the desired semiconductor nanocrystals produced, growth termination may be achieved by one or more processes which include, but are not limited to, reducing the temperature of the sol containing the semiconductor nanocrystals to a temperature effective for halting further crystalline growth (e.g., a cooling process); and the addition of a crystal growth terminator, to the sol containing the semiconductor nanocrystals, in an effective amount for halting further crystalline growth after a desired size is obtained." (see column 13, lines 50-62; also, generally, column 13, line 50 to column 14, line 49).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to further provide a quench fluid inlet port downstream from the aging section and upstream from the at least one outlet channel in the apparatus of Wang et al., on the basis of

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suitability for the intended use, because a quench fluid inlet port would allow for the introduction of a quench fluid (e.g., a growth terminator), for halting further crystalline growth, as is conventional in the art of nanocrystal synthesis, as taught by Barbara-Guillem et al.

The recitations with respect to a particular quench fluid, however, have not been given patentable weight, because the quench fluid is not considered part of the apparatus.

11. Claims 5, 6, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (*Chem. Commun.* 2002, pp. 1462-1463).

Wang et al. discloses that the width and depth of the aging channel are within the instantly claimed ranges (i.e., a channel depth of 200  $\mu\text{m}$  and a channel width of 360  $\mu\text{m}$ ; at page 1462, column 1, second to last paragraph). Although Wang et al. does not specifically disclose a width and depth measurement for the at least one inlet channel or the channel of the micromixing block, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate width and depth (such as a width and depth within the instantly claimed ranges) for the various channels in the apparatus of Wang et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because it has been held that changes in size involve only ordinary skill in the art. *In re Rose*, 220 F.2d 459, 463, 105 USPQ 237, 240 (CCPA 1955), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

12. Claims 2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al. (*Nano Letters*, 2003, Vol. 3, No. 2; pp. 199-201) in view of Yasuda et al. (US 6,244,738).

Chan et al. is silent as to the apparatus further comprising an ultrasonication means.

Yasuda et al. teaches an apparatus comprising a microchannel 20, wherein the apparatus further comprises an ultrasonication means in the form of an ultrasonication transducer attached to the apparatus (i.e., elements 31, 32, 33, 41, 42, 43; see FIG. 1, 2; column 1, line 5 to column 3, line 36). It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide an ultrasonication means in the apparatus of Chan et al., on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because the ultrasonication means comprises a stirrer having a structure that does not cause an increase in flow resistance in the microchannel, and is not susceptible to drops remaining in the microchannel, as taught by Yasuda et al. (column 1, lines 50-54).

13. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al. (*Nano Letters*, 2003, Vol. 3, No. 2, pp. 199-201) in view of Yasuda et al. (US 6,244,738), as applied to claim 2 above, and further in view of Chandler et al. (US 6,506,584).

The collective teaching of Chan et al. and Yasuda et al. is silent as to whether the ultrasonication means may comprise an ultrasonication bath, in which the microreactor or a portion thereof is emersed. Chandler et al. (column 5, lines 4-26; column 7, line 24 to column 8, line 18; FIGs. 2, 4) teaches a conventionally known ultrasonication means comprising an ultrasonication transducer or an ultrasonication bath. It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the ultrasonication means of Chandler et al. for the ultrasonication means in the modified apparatus of Chan et al., on the basis of suitability for the intended use thereof and absent showing any unexpected results thereof, because the substitution of known equivalent structures involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re*

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*Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

14. Claims 5, 6, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al. (*Nano Letters*, 2003, Vol. 3, No. 2, pp. 199-201)

Chan et al. discloses that the width and depth of the aging channel are within the instantly claimed ranges (i.e., a width of 200  $\mu\text{m}$ , a depth of 57  $\mu\text{m}$ ; see description of FIG. 1, b). Chan et al., however, does not specifically disclose a width and depth measurement for the at least one inlet channel or the channel of the micromixing block. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate width and depth (such as a width and depth within the instantly claimed ranges) for the various channels in the apparatus of Chan et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because it has been held that changes in size involve only ordinary skill in the art. *In re Rose*, 220 F.2d 459, 463, 105 USPQ 237, 240 (CCPA 1955), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

#### ***Response to Arguments***

15. Applicant's arguments filed January 26, 2007 have been fully considered but they are not persuasive.

Comments regarding the rejection of 15-30, 34, 35, 37, 117 and 118 under 35 U.S.C. 112, second paragraph

Regarding claim 15, Applicants indicate that the claim has been cancelled. It is noted, however, that the claim has not been cancelled. Therefore, the rejection has been maintained.

Regarding claims 16-30, 34, 35, 37, 117 and 118, the rejections under 35 U.S.C. 112,

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second paragraph, has been withdrawn. However, the limitations recited in each of the claims have not been given patentable weight, since the inclusion of a material or article worked upon by an apparatus does not further limit apparatus claims. See MPEP 2115.

Comments regarding the rejection of claims 5-7, 9-14, 16-32 and 116-118 under 35 U.S.C. 102(b) as being anticipated by Nikiforov (US 6,107,044)

Applicants (beginning at page 8, line 10 of the response) argue that the,

“Examiner states that the recitation of “at least one colloidal nanoparticle” adds no further patentable weight because the inclusion of a material or article worked upon by an apparatus does not further limit apparatus claims... the line of cases cited by the Examiner to support this proposition does not apply to the system claims included in the present application.”

In particular, Applicants (beginning at the bottom of page 6 and ending at the middle of page 7 of the response) argue that the,

“Examiner notes that the inclusion of a material or article worked upon by an apparatus does not further limit apparatus claims. Examiner cites to the MPEP § 2115 and reiterates all by the last paragraph of the section. The last paragraph of the section, however, applies to the present claims. Independent claim 116 is a “system” claim, comprising various articles grouped together (e.g., at least one nanoparticle, inlet channel, micromixing block, aging section and outlet channel, wherein these components all reside on a substrate)... (“Note that [Ex Parte Thibault, In re Young, In re Casey] is limited to claims directed to machinery in its intended use. It does not apply to product claims or kit claims (i.e., claims directed to a plurality of articles group together as a kit.”).”

The Examiner respectfully disagrees. The instantly recited “system” claims are not kit claims. They are apparatus claims. The elements of the system (i.e., the inlet channel, at least one



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micromixing block, ageing section and outlet channel) are not merely “a plurality of articles grouped together as a kit”, as argued by Applicants. Instead, the elements are interrelated both structurally and functionally, to define an apparatus for synthesizing nanoparticles.

In the examination of apparatus claims, it is proper that no patentable weight is given to the material contents of the apparatus, or the particular product being synthesized by the apparatus. In the instant case, it is proper that no patentable weight has been given to the particular reactants being fed to the apparatus, or to the nanoparticle being synthesized within and discharged by the apparatus.

In addition, Applicants (last paragraph on page 8) argue that the,

“... Examiner points to the separation channel portion 210 of Nikiforov as being an “ageing section” as claimed by the present invention... To enable this separation, the separation channel is filled with a polymeric material... In addition, Nikiforov discloses the use of electrokinetic flows to drive material through the polymeric material/separation matrix within the separation channel... A device as described by Nikiforov does not comprise an aging channel as claimed by the present invention. The packing material necessary for the separation channel to function, along with the use of electrokinetic flows to drive the nucleic acid through the separation channel would destroy the intended function of the ageing channel of the present invention. Nikiforov does not disclose, teach or suggest a system comprising an ageing section that provides ageing length for the growing nanoparticles.”

The Examiner respectfully disagrees and maintains that the device of Nikiforov structurally meets the claims. The Nikiforov structure comprises a body structure **202**, typically formed from at least two mated planar substrates. Disposed within the body structure **202** is a channel portion **210** having a serpentine geometry (see FIG. 2). Whether the channel portion **210** is to function as a “separation” channel or an “aging” channel is merely a matter of intended use.

In the event that an intended use of “separation” were desired, Nikiforov discloses that, “separation matrix or polymer is typically introduced into the channels of the microfluidic device by placing the polymer solution in one well of the device and allowing capillary action to draw the polymer through the channels of the device.” (see column 6, lines 8-14). Thus, the polymer solution is merely a material worked on by the apparatus of Nikiforov. In the event that a “separation” function were not required, one having ordinary skill in the art would simply omit the addition of a separation matrix or polymer solution to the channel portion **210** of the device. Similarly, one having ordinary skill in the art would simply not use the electrokinetic means. The omission of an element with a corresponding omission of function is within the level of ordinary skill in the art. Structurally, the instantly claimed aging channel is merely a channel, formed in a substrate, having a predetermined length. Thus, the channel portion **210** of Nikiforov is structurally capable of performing the intended use of “aging”.

A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for

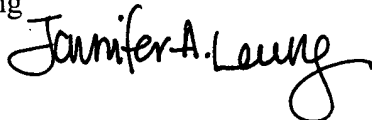
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the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jennifer A. Leung

April 10, 2007

A handwritten signature in black ink that reads "Jennifer A. Leung". The signature is written in a cursive style with a large, looping "J" and a long, sweeping underline.